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Abstract

FIVE YEARS' EXPERIENCE WITH THE HUNGARIAN VVRS-TYPE REACTOR

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The 2 MW /thermal/ VVRS type research reactor operated at Budapest went critical the first time on March 25, 1959. It has been used since then for the study of problems in reactor and nuclear physics, solid state physics and nuclear chemistry as well as for the routine production of radioisotopes.

Since the start each of the horizontal channels of the reactor has been fully exploited for intensive research centered mainly to investigations as

1/ Physics of nuclear fission
2/ Angular correlation in /n,gamma/ reactions
3/ Isomeric cross sections for /n,gamma/ reactions
4/ Radiation effects on transformation processes in alloys
5/ Critical magnetic scattering of neutrons
6/ Neutron diffraction experiments
7/ Cold neutron experiments on ferromagnets
8/ Integral neutron scattering cross section of organics.

The vertical channels of the reactor have been used for

1/ Isotope production
2/ Radiochemical research

3/ Activation analysis

4/ Radiation chemical research

5/ Irradiation for industrial and agricultural research purposes.

The production of radioisotopes started in 1960 and covered in 1963 already 50 different preparations on the production schedule. The number of aluminum target holders for the samples to be irradiated increased from 200 in 1960 to 1000 in 1963. The most economical items proved to be the short and medium lived isotopes.

In 1963 an in-pile loop with additional electrical heating element was built for investigating the radiolytic behaviour of organics seeming to be useful reactor coolant-moderators. The experimental loop has been operated without breakdown for 1000 hours within the core. Useful information has been obtained by the loop experiment on the decomposition rate of some organics under continued and simultaneous exposure to radiation and high temperature. The operation of the in-pile device did not interfer in any way with the other research activities or the isotope production going on simultaneously with the use of the reactor.

The operation time of the reactor from March 25, 1959 to December 31, 1963 amounted to 22 8000 MWhours. The refuelling required for the compensation for burn-up and poisoning amounted to 2560 gr U^{235}.

The breakdowns leading to standstill were due to

failure in the mains supply network /9 standstills, total loss 15 hours/

failure in mechanical facilities /7 standstills, total loss 46 hours/

failure in instrumentation /6 standstills, total loss 7 hours/.

Total loss in operation time 68 hours, that is 5,9 %o of the total number of hours the reactor has been operating.

No breakdown was due to any fault of the servicing personnel.

The technical facilities incorporated in or accessory to the reactor have been modified or replaced in several instances to meet special requirements or to be improved on basis of operational experience.

The reactor staff servicing reactor operation and in charge of the maintenance work has taken part, in addition, in the design, building and setting up of apparatus required for individual experimental research activities carried out with the use of the reactor. The reactor is attended to in three shifts by 5 persons per shift. The whole staff is regularly trained professionally and kept informed of the progress in the relevant field.